



United States
Department of
Agriculture

Natural
Resources
Conservation
Service (NRCS)

September 30, 2002

NEDC DETAILED DEVELOPMENT REPORT

National Conservation Forestry Planning Training

Web/CD-based training on integrating forestry technology into conservation planning; **D**esigned for agency planners, partnership employees and technical assistance providers; **C**omplementary to the *Conservation Planning Training* curriculum.

Contents:

Title, Purpose, Goals, Objectives	2
Course Modules and Assignments	3
Module 1 - Introduction	4
Module 2 – Pre-planning	4
Module 3 – Collect Resource Information	4
Module 4 – Analyze Resource Information	6
Module 5 – Decision Support	6
Module 6 - Application	8
Module 7 – Follow-up and Evaluation	8
Module 8 – Course Summary	9
Scenario Land Uses/Issues	10
Scenario Unit Descriptions	11
Development Team	15
Scenario Map	16

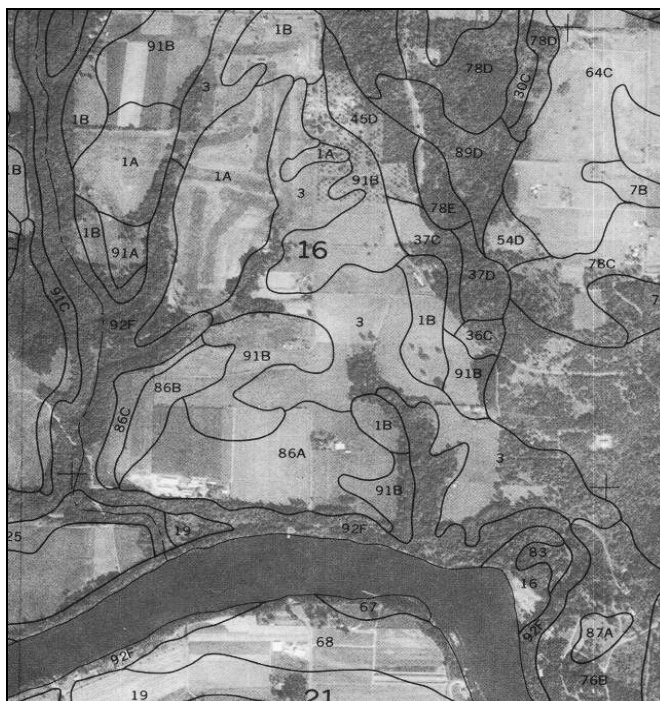


Figure - A National Cooperative Soil Survey map depicts cropland, pasture, forest and other uses in a productive U.S. farming region. Forest conservation and agroforestry opportunities are integral aspects of conservation planning pursued by U.S. farmers and ranchers that should be closely coordinated with the decision-making process on agricultural lands. Forest, once a major land use and cover, is now fragmented in many areas. Forestry and agroforestry technologies offer producers and local organizations an opportunity to address water quality, product diversity, and fish and wildlife habitat issues while allowing the greater part of the land to be used for intensive food and forage production. Soil interpretations and capabilities are the underlying basis of NRCS conservation forestry planning.

Course Title:

CONSERVATION FORESTRY PLANNING

Purpose:

This course will complement the Natural Resources Conservation Service's Conservation Planning Course. This course is specific to conservation planning on forestland as well as the integration of forestry technology on other land uses. It will focus on the tools and processes used to deliver conservation technical assistance. The course is designed to provide additional training to NRCS planners, partnership employees and conservation technical assistance providers on how to integrate forestry technology into conservation planning.

Goals:

The participant will be able to conduct, with supervision, the nine steps of conservation planning involving forestry technology. The participant will be able to assess resource management problems and opportunities, develop alternative resource management systems, and implement and evaluate a conservation plan involving forestry technology.

Course Objectives:

1. Describe the opportunities for integrating forestry technology into conservation planning.
2. List and describe pre-planning activities.
3. List and describe the appropriate tools and techniques for all phases of conservation planning.
4. List and describe key resource problems and concerns.
5. Identify key objectives based on a landowner interview.
6. Compare resource inventory data with established quality criteria and desired landowner objectives to refine the list of key resource concerns.
7. Identify conservation practices that will improve conditions to meet quality criteria and landowner objectives.
8. Formulate and evaluate forestry-related resource management system alternatives.
9. Formulate a plan, specifications and an implementation schedule based on client decisions.
10. List and describe the kinds and scope of technical assistance that can be provided to implement practices.
11. Describe and evaluate the effects of the resource systems applied and the potential need for plan/practice revisions.

Course Modules and Assignments:

Module 1 – Introduction (Barb McWhorter, WV)

Module 2 - Pre-Planning Activities (Craig Ziegler, OR)

Module 3 - Collect Resource Information* (Nancy Young, AR)

Module 4 - Analyze Resource Information* (Doug Wallace, MO)

Module 5 - Decision Support* (Sally Butler, ME)

Module 6 - Application* (Bob Logar, MT)

Module 7 – Follow-up and Evaluation* (Lyn Townsend, WSSI)

Module 8 - Course Summary (Barb McWhorter, WV)

Review, Editing, Layout – (Dennis Neffendorf**, NHQ; Georgia Spiller, NEDC)

*For these modules, students will study and complete exercises related to conservation forestry on the following the lands uses: Headquarters, Crop, Grazed (pasture, naturalized pasture, grazed forest), and Forest. For instructional purposes, training will be demonstrated by use of all CMU's except 1a, 2c and 3c. CMU's 1a, 2c and 3c will be used for testing of student's knowledge.

**Course Development Leader

Development Notes:

- First drafts of lesson plans will contain image/diagram placeholders (followed by descriptions in parentheses). Digital images/diagrams can be stored as separate files using a correlated file name.
- The working ftp location for file exchange and review will be at: <ftp://ftp.wcc.nrcs.usda.gov/watershed/forestry-tng/>. Developers will have individual folders identified by module number and name, e.g., [module8-mcwhorter](#).
- Lesson plans will be developed and correlated directly to specific module objectives and questions listed later in this report. New objectives and questions may be added as necessary.

Learning Objectives and Key Questions

Module 1 - Introduction

1. Define the purpose, goal, and objectives of the planning course.
2. Describe the opportunities for integrating forestry technology into conservation planning.
3. Summarize the use of the training scenario.

Module 2 - Pre-Planning Activities

1. Describe the importance of pre-planning activities.
 - a. Choose all appropriate items. (prepare list of applicable and non-applicable items)
2. List and describe the kinds of information and data that need to be collected prior to a field visit. ("type mapping" exercise)
 - a. Choose applicable kinds of info/data. (prepare list of right/wrong items)
3. List and describe the tools that can be used in the pre-planning activities.
 - a. Choose applicable kinds of tools. (prepare list of right/wrong items)

Module 3 - Collect Resource Information – (all scenario land uses)

1. List and describe resource problems, resource concerns, and resource opportunities. (assumption is that the "landowner interview" is a walk through the property)
 - a. What are the resource concerns for each land use? (Student would pick out concerns/opportunities stated by the landowner and checkmark the appropriate items on the resource concerns table. This would also include known regional or local concerns based on pre-planning.)
 - b. On cropland, what indicates that there is a wind erosion problem? (soil/dust in HQ; Spring damage to crops)
 - c. On cropland, is sheet-rill erosion found on all parts? (only on sloping south part)
 - d. On pasture land, what indicates that there is water quality problem? (trampling of banks and turbidity in intermittent stream and spring area)
 - e. On grazed forest land, where is there a concurrent Plants-Management-Establishment and Animals (domestic)-Management-Population/Balance concern?
 - f. On forest land, what part of the forest has a Plant-Condition-Health/Vigor concern involving insects and disease? (insects/disease in 3a)
 - g. On the headquarters land, what indicates an Animal-Management-Population/Balance concern? (deer damage)

2. Identify key landowner objectives.
 - a. Match the landowner objectives to 'resource concerns/opportunities.' (highlight "H" resource concerns dealing with capital, client well being, profitability)
3. List the kinds of resource inventory techniques, tools and data that will be needed.
 - a. Match the kinds of information/data produced from each inventory technique/tool in the given list. (develop list by land use; increment borer, WEQ, RUSLE2, clinometer, WQ Indicators Guide, zig-zag transect, fixed plot, variable plot, et cetera and so on)
 - b. Based on resource concerns and landowner objectives, what inventory techniques, tools and data are needed? (develop list of inventory materials by land use/resource concern and then students will checkmark. Doing this will get students to understand that different units have different conditions.)
 - c. Where would information about when and how to use forestry-related techniques and tools be found? (NFM, NFH, state technical notes, FOTG; develop table to present a matching question to students or question of which are not appropriate from a list, etc.)
4. Perform the inventory (information for each land use/unit given to students; some items will be calculated, summarized, etc.)
 - a. For the forest stand on the steep slope east of the headquarters (show as colored area on map), what is the average diameter and average spacing of the trees? (partially completed zig-zag transect, fixed plot or variable plot forms)
 - b. For the forest stand that occurs along Noname crick (show as colored area on map), what is the species composition? (use species A, B, C,D)
 - c. For the crop area with wind erosion concerns (show as colored area on map), what is the unsheltered distance from WEQ Table E? (provide table E and WEQ 'run')
 - d. For the crop area with water erosion (show as colored area on map), what slope length would be required to reach "T"? (create table of RUSLE2 A's for various slope lengths including the benchmark slope length. Have students pick out slope length that T is first is reached)
 - e. For the grazed area, what is the canopy cover percentage for the conifer stand southeast of the pasture (show as colored area on map)? (provide density charts 0-100% and a sample from unit 2c)
 - f. For the grazed forest hardwood stand (show as colored area on map) southeast of the spring, what is the stand stocking level? (prepare mock up of plot info which includes basal area, trees per acre, diameters)
 - g. For the naturalized pasture (show as colored area on map), what trees species are adapted to this area and what is the site index for each species? (mock up soil survey information with 'site index' by tree species information)
 - h. For the headquarters area, what tree and shrub species are adapted and what are their expected 20-year heights? (CTSG's; prepare mock up of CTSG)

Module 4 - Analyze Resource Information – (all scenario land uses)

1. Identify and describe resource analysis tools, methods and references that can be used to compare existing conditions with quality criteria.
 - a. How are quality criteria and inventory data used to evaluate benchmark conditions? (multiple choice question)
 - b. Match the kinds of analysis tools/methods with their corresponding inventory technique/tool(s). (develop list by land use)
2. Compare resource inventory data with established quality criteria (including social, cultural and economic conditions) and landowner objectives.
 - a. Based on comparing inventory information and landowner objectives with RMS quality criteria, what operating unit land uses/conditions do not meet quality criteria levels? (provide quality criteria for students to make comparisons)
 - b. Where do these problems occur? (choose the graphic/map that best organizes or “groups” the resource problems; make some obviously wrong, make some close but not quite right; the “right” map will have the correct numbers that will be used for the remaining modules.)

Module 5 - Decision Support – (all scenario land uses)

1. Identify the sources of information that will be needed to formulate and evaluate resource management system alternatives.
 - a. Choose the sources from the given list. (answer: list of resource concerns, CPPE, practice standard purposes)
2. Identify conservation practices that will improve conditions to meet quality criteria and landowner objectives.
 - a. For CMU's 1a, 2c, and 3c, develop a list of practices that will improve conditions to meet quality criteria and landowner objectives. (lesson plan will demonstrate how this is done for CMU's HQ, 1b, 2a, 2b, 2d, 3a, 3b; provide list of concerns by CMU, CPPE, practice standard purposes; use Cropland group's CPPE but take out practices that are not applicable such as irrigation practices)
3. Formulate and evaluate forestry-related resource management system alternatives. (the first part of the lesson will demo CMU's HQ, 1b, 2a, 2b, 2d, 3a, 3b)
 - a. For HQ, why is *use exclusion* used in both RMS alternatives? (animal-*wildlife*-management-pop/bal)
 - b. For cropland CMU 1b, what practice addresses both water erosion problems (sheet-rill and ephemeral gully) and produces an agroforestry specialty crop for the landowner? (answer: *alley cropping*)
 - c. For grazed land CMU 2a, RMS 1 changes the land use in the south end to forest. What are consequences to the livestock enterprise? (water source,

- loss of forage) How could the landowner compensate for this consequence? (water development, intensify forage production on rest of unit and other grazed units)
- d. For grazed land CMU 2b, did the presence of arrow head chips in the road way alter the practice list in RMS 2? (answer: NO) Who could provide guidance during the evaluation process? (cultural resources specialist)
 - e. For grazed land CMU 2d, what are the benefits of excluding livestock? (reduced soil compaction, increased regeneration, less damage to high-quality trees and understory ginseng)
 - f. For forest land CMU 3a, what practice in the RMS's reduce fuel load? (forest stand improvement, prescribed burning) What practice isolates the fuel load and reduces the risk of wildfire? (firebreak)
 - g. For forest land CMU 3b, what effects will the riparian forest buffer have on water quality?
 - h. Stream bank erosion control is a purpose in the riparian forest buffer practice standard? (T or F; answer = F)
 - i. Prepare two RMS alternatives for CMU's 1a, 2c, and 3c. (*first approach*: lesson plan will have 4 alternatives for each CMU that are similar; only two alternatives will be correct; *second approach*: provide finite set of likely practices and effects; use various sheets to analyze effects and assure that RMS meets quality criteria levels; prepare two RMS's use this approach)
 - j. For CMU 1a, does windbreak/shelterbelt establishment provide immediate protection? (answer = NO; student RMS's should include complementary practices that care of erosion during early years)
 - k. For CMU 2c, what practices in your RMS alternatives are essential for increasing forage production and tree volume growth and vigor?
 - l. For CMU 3c, what are the primary practices in each RMS alternative that reduce soil erosion on roads and trails? (655 in RMS1; 342-472 in RMS2)
4. Describe methods to communicate resource management system alternatives to the client to result in decisions.
 - a. What statements best describe ways or suggestions for successfully communicating with landowners during the decision-making process? (prepare list with correct and incorrect statements using the Art of Communication pamphlet)
 - b. What are forestry-related visual aids for helping landowners make decisions? (increment cores, observing site damages, environmental and economic effects graphics and diagrams, response curves, before/after pictures of practices)
 5. Formulate a plan with an implementation schedule based on client decisions. (decisions including general dates of practice implementation for each CMU are given to students)
 - a. What examples are appropriate for documenting decisions in the landowner's copy? (prepare list for students to choose from; Yes – plan map, job sheets,

- soils map and brief descriptions, practice titles, narratives and schedule, etc.;
No – practice standards, planning policy, CPPE matrix, etc.)
- b. In CMU 1a, why are *cross-wind trap strips* used in conjunction with *windbreak/shelterbelt establishment*?
 - c. In CMU 2b, what practices need to precede *tree/shrub establishment*? (forest site prep, pest management)
 - d. In CMU 3a, what times of the year would be best for conducting *forest stand improvement*? (lesson will have beetle vs. thinning period table)

Module 6 – Application – (all scenario land uses)

1. List and describe the main kinds of available references, job sheets, application tools, etc.
 - a. Match application materials/tools with their descriptions. (practice standards, state specification, job sheets, how-to tech notes, demo videos, etc.)
2. Prepare applicable site-specific specifications/designs to implement individual practices (mention of permits, laws, regulations, etc. in lesson).
 - a. What site-specific information is typically developed when tree-shrubs are being established?
 - b. What site-specific information is typically developed when trees will be harvested?
 - c. When is permitting best accomplished? (feature 404 permitting as an example in the lesson; then pick best answer from list)
 - d. In CMU 1a, what some reasons that a windbreak/shelterbelt is not established immediately adjacent to the county road?
 - e. In CMU 2c, how was the tree spacing optimized for both tree growth and forage growth? (lesson includes a chart/table showing trade-off issues)
 - f. In CMU 3b, what are the minimum widths of the riparian forest buffer zones? (answer: zone 1 = 15 feet, zone 2 = 20 feet; there is no zone 3)
3. List and describe the kinds and scope of assistance that can be provided to implement practices.
 - a. Checkmark those activities on list that are appropriate. (lesson plan would cover policies related to assistance on forest land and forestry-related technology; create list of acceptable and unacceptable situations)

Module 7 – Follow-up and Evaluation – (all scenario land uses)

1. List and describe the significance of follow-up activities.
 - a. Is it necessary for the client and planner to meet together to review the conservation plan during follow-up? (answer = Yes)
 - b. What are some of the key activities the planner should review with the client regarding forest-related practices? (Prescribed burning – extent adequate, intensity adequate, damage to residual trees; Tree planting – survival rate

- adequate, seedling depth and proper root placement, plant competition control, spacing, correct species, animal damage; etc.)
2. List and describe the kinds of available evaluation references and tools.
 - a. Match references/tools with descriptions (lesson would cover various references and tools such as technical notes, models, measuring equipment, checklist, as-builts, planner knowledge, job/design sheets)
 3. Evaluate the effects of the applied practices and resource management systems. (including proper practice implementation)
 - a. Do effects meet quality criteria and desired future conditions? (lesson provides students with an evaluation report after 10 years of practice implementation; the report will contain such impacts as tree growth response, shading-water temperature, erosion rates, aquatic indexes, energy consumption by headquarters, landowner acceptance/satisfaction)
 4. List and describe reasons for plan and practice revisions.
 - a. Choose all applicable situations that could trigger the need for revision. (prepare list to include such items as changing objectives, new program provisions, human/natural disturbances, new technology, etc.)

Module 8 - Course Summary

1. Restate the purpose, goal, and objectives of the planning course.
2. Restate the opportunities for integrating forestry technology into conservation planning.

Scenario Land Uses and Issues

Headquarters

- unsheltered from wind/snow deposition
- wildlife habitat
- wildlife damage

Crop land

- unsheltered from wind
- water erosion and sediment
- agroforestry opportunities (windbreak/shelterbelts, alley cropping)
- wildlife habitat
- wildlife damage

Grazed lands (pasture, naturalized pasture, grazed forest)

- riparian impacts
- uncontrolled livestock
- excessive overstory shade
- soil compaction
- agroforestry/silvopasture opportunities/special forest products
- wildlife habitat
- wildlife damage

Forest land

- high-graded, under-productive stands
- overstocked stands
- harvest/road/trail compaction, erosion and sediment
- riparian impacts
- stream crossing impacts, fish passage
- wildlife habitat
- wildlife damage
- competing vegetation
- wildfire hazard

Scenario Unit Descriptions

Initial Interview/Walk-through with Landowner

Objectives and Current Conditions (and lesson development notes)

Note: During pre-planning, the planner delineated and numbered some preliminary unit designations. This was done to facilitate and document the initial walk-through of the property with the landowners.

Headquarters Unit

Objectives and Concerns – The owners have had the property for 25 years. They are concerned with snow drifting on the driveway and near the house during winter and on the nearby county road. The owners are concerned with high energy consumption due to winter winds. Soil deposition and dust in the farmstead in spring months have been noted. The wife's mother lives in the house and is an avid bird watcher and a member of the local chapter of the Audubon Society. Grandchildren are nearing college age and the owners want to help with tuition expenses.

HQ – The unit consists of a house, garage and shop, well, a small barn for hay and silos for grain storage; hay and grain are purchased off-site. There is a small confined feeding/holding area for beef cattle. Deer frequently damage the few ornamental tree/shrubs around the house every year. (Lesson notes: Issues include no protection from wind and snow deposition, wildlife habitat and wildlife damage. Primary practices for consideration are *windbreak/shelterbelt establishment*, *tree/shrub establishment*, and *upland wildlife habitat management*.)

Crop land units

Objectives and Concerns – The crop land adjoins a large wind problem area to the northwest. Crop seedling establishment is impaired by winds on the north unit (Soil A). The owners do not want to change their annual crop types, equipment, rotation and residue rates but are interested in windbreaks and other ways to control wind erosion and dust. Based on a recent agroforestry seminar, they are also interested in rows of trees on their sloping, eroding crop land (Soil B) that could produce a crop of nuts and reduce erosion as long as no more than 5% of the crop land is used. The owners have noted that there are limited fall hunting opportunities compared to neighboring farms.

1a – Slopes range from 0-2%. Wind erosion appears to be high based on deposition of soil downwind along the west edge of the farmstead. (Lesson notes: Wind erosion exceeds "T" and the unsheltered distance will be 150 feet. Primary practices for consideration are *windbreak/shelterbelt establishment*, *cross wind trap strips*, *upland wildlife habitat management*, and *herbaceous wind barriers*. Cross wind trap strips and

herbaceous wind barriers will be needed early on until windbreaks grow and become functional.)

1b – Slopes range from 3-8%. Sheet and rill erosion appears to be high based on deposition along east fence line. An ephemeral gully was observed at the south end of the unit. (Lesson notes: Sheet-rill erosion exceeds “T” and calculations show that “T” can be achieved if slope lengths do not exceed 125 feet. Primary practices for consideration are *alley cropping*, *vegetative barriers*, and *upland wildlife habitat management*.)

Grazed units

Objectives and Concerns – The grazed land consists of pasture, naturalized pasture, and grazed forest land. The owners alternate livestock grazing between the pasture unit and the naturalized/grazed forest units. Livestock are confined during winter and early spring. The owners are interested in creating a “silvopasture system” on the naturalized pasture based on the agroforestry seminar they attended to increase the amount of long-term wood production along with production from the grazed and ungrazed forest areas. They also realize the conifer forest canopy is too dense on the sloping land (grazed forest) for good understory forage production and that a forest harvest could yield a significant amount of income. They are concerned with stream bank trampling at the south end of the pasture and grazed forest units. They realize possibilities of improving wildlife habitat at the “south end” because of the adjacent Nature Conservancy ownership and are open to any reasonable ideas. The owners expressed an interest in developing ginseng in a small area in a remote part of the grazed forest so that access would be restricted and the Noname Creek would not have to be crossed in spring time.

2a – (pasture) – Slopes range from 2-4%. Evidence of wind or water erosion was not found. Trampling damage of the stream banks were observed. Upland bird species were noted along the edges of the unit at the south end. (Lesson notes: Primary practices include *riparian forest buffer* and *use exclusion*. See lesson notes for *2c*.)

2b – (naturalized pasture) – Slopes range from 0-2%. The owners mentioned that the unit was once a Christmas tree plantation and that their grandchildren when young used to collect arrow head chips on road cut at south end when they visited each summer. (Lesson notes: Consideration of cultural resources needs to be reviewed. Primary practices include *tree/shrub establishment* and *prescribed grazing* which has been referred to as a silvopasture system.)

2c – (grazed forest) – Slopes range from 8-15%. A naturally-established, even-aged stand of conifers occupy the unit and range from 12-18" diameters-at-breast-height (dbh). There are scattered openings of herbaceous vegetation/forage; canopy shading has reduced forage production under the trees. Snags are scattered throughout the unit. During the walk-through, the planner noted that the south end consisted of upland mixed "high quality" hardwoods adjacent to the spring-fed stream and slopes ranged from 15-25%. The hardwoods ranged from 6-14" dbh and were uneven-aged mast-producing trees. Soils had evidence of livestock trampling and compaction. Also, tree regeneration and understory vegetation were greatly reduced compared to the adjacent ownership. (Lesson notes: Primary practices include *forest stand improvement* and *prescribed grazing*. Realizing the change in resource conditions in the south end, the planner has tentatively suggested a new unit **2d** and also mentioned that it could be extended into the south end of unit **2a**. This becomes a decision-point for the student on whether or not to advise the landowners to set up a new CMU. Primary practices for **2d** include *use exclusion* for an indefinite period concurrent with a limited selection harvest or *forest stand improvement* and the natural regeneration components of *tree/shrub establishment*, a *fence*, and a *riparian forest buffer* along the stream. The *riparian forest buffer* and *use exclusion* could be extended into the south end of unit 2a to eliminate trampling damage of stream banks and improve *upland wildlife habitat management*. This area has potential for ginseng establishment.)

Forest units

Objectives and Concerns – Much of forest land was cutover 5 years ago. The logging was unsupervised and resulted in a "high-graded" condition where most of the high-quality trees were removed. Trails and landings on the sloping land east of Noname creek were left untreated and have since rutted in many locations. The owners want to restore a productive, wood-producing condition as soon as possible for purposes of income later on and/or inheritance by grandchildren. They realize the wildlife and recreational importance of the bottomland area along the Creek and that it connects to the Nature Conservancy bottomland hardwood property. The owners have noted that trout have diminished when the tree shade was removed from riparian areas. Also of concern is the amount of slash and debris buildup occurring in on the steeply sloping forest near the farmstead. Local kids have used the county road 'dead end' for parties and usually start campfires.

3a – Slopes range from 25-40%. Shade-intolerant conifers occupy the site and range from 4-8" dbh. There is increasing mortality from bark beetles and tree-to-tree competition with significant amounts of slash and debris that pose a wildfire risk particularly in summer and early fall months. (Lesson notes: Primary practices include *firebreak*, *forest stand improvement*, *use exclusion-humans*, and *pest management*.)

3b – Slopes range from 0-2%. Uneven-aged "high-graded" bottomland hardwoods occupy the site and are of variable size trees up to 25" dbh. Noname creek runs

through the unit and is a small third order stream. The stream crossing consists of an old, arch-type culvert that has been degraded by flood flows and appears to be undersized. The downstream end is elevated and creates a barrier to fish movement upstream. Stream banks are eroding in several spots and the lack of shade has increased stream water temperatures and impaired the cold water fishery. This unit is adjacent to a large Nature Conservancy bottomland hardwood property to the South. (Lesson notes: Primary practices include *riparian forest buffer*, *streambank and shoreline protection-bioengineering*, *forest stand improvement* outside of buffer, *fish passage*, *access road* and *stream habitat improvement and management*.)

3c – Slopes range from 10-20%. All merchantable conifers and hardwoods were harvested 5 years ago; the site is now occupied with herbaceous, shrub and undesirable hardwood tree species. Roads and skid trails have numerous areas of excessive erosion partially caused by trespass 4WD vehicles. (Lesson notes: Primary practices include *forest site preparation*, *tree/shrub establishment*, *riparian forest buffer* along drainages, *pest management*, *forest harvest trails and landings*, *use exclusion* on roads, *critical area planting*, and *forest stand improvement*. In regards to erosion control, one RMS alternative may include *critical area planting* and *use exclusion* devices such as gates or over-deepened waterbars, while another RMS alternative could continue the use of vehicles but require the installation of waterbars and *critical area planting*.)

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